

CLAIMS

1. A locating and monitoring system installable on the premises of a facility, said system including:
 - at least one transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow identification of such transmitter means at any of diverse sites in the facility, said transmitter means including means for transmitting pulse bursts at diverse times during predetermined time intervals ^{use limitation} for preventing synchronization with resident signals in the facility, said pulse bursts defining a unique binary identification code; and means responsive to said pulse bursts for establishing the location of said transmitter means in said facility.
2. The system of claim 1 wherein said transmitter means includes infrared means for emitting said pulse bursts, and wherein said means responsive to said pulse bursts include infrared receiver means responsive to said pulse bursts for identifying said binary identification code.
3. The system of claim 1 wherein said transmitter means includes a microcontroller responsive to an algorithm.
4. The system of claim 1 wherein said transmitter means transmits said pulse bursts, according to a pulse position scheme to represent at least two binary bits of the identification code data with one pulse for reducing the number 5 of pulses required to represent said unique binary identification

code and therefore minimize power consumption by said transmitter means.

5. The system of claim 4 wherein said pulse bursts include an error detection code to insure integrity of pulse bursts transmission using a pulse position scheme to represent at least two binary bits with one pulse, and wherein said means responsive to said pulse bursts includes means for recalculating an error detection code using the received binary identification code and comparing the recalculated error detection code to the received error detection code for validation of the binary identification code.

6. The system of claim 5 wherein said error detection code includes a binary checksum which comprises the binary sum of all of the digits of the said binary identification code.

7. The system of claim 1 wherein said means for transmitting pulse bursts includes a microcontroller having memory containing said unique binary identification code.

8. The system of claim 7 wherein said microcontroller include microcode to calculate a checksum of said binary identification code and generates said pulse bursts which include a start bit, said binary identification code, and said checksum.

9. The system of claim 1 wherein said identification code comprises at least 20 binary bits to provide at least 1,048,576 different identification codes.

10. The system of claim 1 wherein each pulse burst is of about 20 milliseconds in duration.

11. The system of claim 1 wherein said pulse bursts each occur once in the predetermined time interval of about one second.

12. The system of claim 1 wherein the means responsive to said pulse bursts includes a microcontroller for executing microcode to establish a valid code burst from received pulse bursts.

13. The system of claim 1 wherein said transmitter means includes a plurality of portable transmitters, each emitting a unique identification code at different times during predetermined time intervals.

14. The system of claim 1 wherein each pulse of said pulse bursts is transmitted by a 10 microsecond flash of infrared light.

15. The system of claim 1 wherein the means responsive to code bursts includes a plurality of discrete receivers each having a reception range about a premises with an allowable overlap with the reception range of another of such receivers; each of said receivers being responsive to said pulse bursts to validate said binary identification code and thereby establish presence of said transmitter means within the reception range of a receiver.

16. The system of claim 15 wherein said transmitter means includes a plurality of transmitters and wherein means responsive to said pulse bursts includes a plurality of receivers joined to a gathering station for validating outputs from each of 5 said plurality of receivers and forming start and stop events, said start events including the identity of the one receiver of said plurality of receivers, the binary identification code of one transmitter of the said plurality of the transmitters, and when the pulse bursts of such transmitter was detected by such 10 receiver; said stop event including the identity of the one receiver of said plurality of said receivers, the unique identification code of the said one transmitter when loss of reception has occurred within the reception range, and when such loss of reception occurred.

17. The system of claim 16 wherein said means responsive to said pulse bursts includes a plurality of said gathering stations connected by a serial port to a central computer which includes a storage medium for storing said start 5 and stop events derived from each of said plurality of gathering stations.

18. The system of claim 17 wherein said central computer includes a plurality of said serial ports, each of said ports being connected to a plurality of gathering stations for receiving said start and stop events.

19. The system of claim 18 wherein said central computer has a interface including a terminal and a keyboard for a user to request and receive the location of any of said transmitter means.

20. The system of claim 19 further including display means responsive to said central computer for assembling reports, and means to input commands to said central computer by an authorized operator to assemble said reports of movements of any 5 of said transmitter means recorded and stored in said storage medium.

21. The system of claim 20 for tracking the movements of hospital personnel and allied hospital equipment, and interfacing to an existing nurse call hospital system by providing: that each of said plurality of said transmitter means 5 comprises a portable communication badge worn by allied hospital personnel, including nurses, and attached to said hospital equipment; said means for establishing the location including a receiver installed in each patient room to interface with said nurse call hospital system; a receiver installed in each patient 10 room for indicating when said allied hospital personnel wearing one of the said badges enters the room, and the class of a number of classes to which the allied hospital personnel belongs; and an interface between said central computer and said nurse call hospital system such that location queries entered at terminals 15 of said hospital system are routed to said central computer.

22. A portable communication unit comprising transmitter means adapted for movement about the premises of a facility with a person, with an animal or with equipment to allow identification of such transmitter means at any of diverse sites in the facility, said transmitter means including means for transmitting pulse bursts at diverse times during predetermined time intervals for preventing synchronization with resident signals in the facility, said pulse bursts defining a unique binary identification code.

23. The portable communication unit according to claim 22 wherein said transmitter means further includes an algorithm to establish said diverse times and said predetermined time interval.

24. The portable communication unit of claim 22 wherein said transmitter means further includes infrared means for transmitting said pulse bursts.

25. The portable communication unit of claim 22 wherein said transmitter means transmits said pulse bursts according to a pulse position scheme to represent at least two binary bits of the identification code data with one pulse for reducing the number of pulses required to represent said unique binary identification code, and thereby reduce power consumption by said transmitter means.

26. The portable communication unit of claim 22 wherein said pulse bursts include an error detection code to insure integrity of transmissions of said pulse bursts.

27. The portable communication unit of claim 26
wherein said error detection code is transmitted using a pulse
position scheme to represent at least two binary bits of the
error detection code with one pulse and thereby reduce power
consumption by said transmitter means.
5

28. The portable communication unit of claim 26
wherein said error detection code includes a binary checksum
which comprises the binary sum of all of the digits of the said
binary identification code.

29. The portable communication unit of claim 22
wherein said means for transmitting pulse bursts includes a
microcontroller having memory containing said unique binary
identification code.

30. The portable communication unit of claim 29
wherein said microcontroller includes microcode to calculate a
checksum of said binary identification code and generates said
pulse bursts which include a start bit, said binary
identification code, and said checksum.
5

31. The portable communication unit of claim 22
wherein said identification code comprises at least 20 binary
bits to provide at least 1,048,576 different identification
codes.

32. The portable communication unit of claim 22
wherein each pulse burst is of about 20 milliseconds in duration.

33. The portable communication unit of claim 22 wherein said pulse bursts each occur once in the predetermined time interval of about one second.

34. The portable communication unit of claim 22 wherein each pulse of said pulse bursts is transmitted by a 10 microsecond flash of infrared light.

35. A stationary receiver installable on the premises of a facility, said stationary receiver including means for receiving infrared transmissions of pulse bursts, said pulse burst defining an unique binary identification code, said pulse bursts occurring at diverse times during predetermined time intervals to prevent synchronization with other resident signals.

36. The stationary receiver of claim 35 wherein each predetermined time interval is determined by an algorithm which uses an unique identification code.

37. The stationary receiver of claim 35 wherein said pulse bursts include a pulse position scheme to represent at least two binary bits of the identification code with one pulse for reducing the number of pulses required to represent said unique binary identification code.

38. The stationary receiver of claim 35 wherein said pulse bursts include an error detection word with said binary identification code to insure integrity of reception of pulse bursts.

39. The stationary receiver of claim 38 wherein said error detection word is transmitted according to a pulse position scheme wherein at least two binary bits of the error detection word are represented with one pulse.

40. The stationary receiver of claim 38 wherein said error detection word is a binary checksum.

41. The stationary receiver of claim 38 further including means for recalculating said error detection word using the received binary identification code and means for comparing such recalculated error detection code with said received error detection code to validate an error free pulse burst reception.

42. The stationary receiver of claim 35 wherein the means of receiving includes a microcontroller for executing microcode to establish a valid code burst from received pulse bursts.

43. A locating and monitoring system installable on the premises of a facility, said system including:

5 at least one portable transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow monitoring of such transmitter means at any of diverse sites in the facility, said transmitter means including means for generating infrared pulse bursts defining a unique binary identification code essentially including an error detection word.

44. A locating and monitoring system installable on the premises of a facility, said system including:

5 at least one transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow identification of such transmitter means at any of diverse sites in the facility, said transmitter means including infrared means for generating pulse bursts defining a unique binary identification code according to a pulse position scheme wherein at least two binary bits of said code are 10 represented by one pulse.

45. A locating and monitoring system installable on the premises of a facility, said system including:

5 at least one transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow identification of such transmitter means at any of diverse sites in the facility, said transmitter means including means for transmitting pulse bursts defining a unique binary identification code,

10 a plurality of receiver means responsive to said pulse bursts for establishing the location of said transmitter means in said facility, and a gathering station joined to each receiver of said plurality of receivers for validating outputs from each of said plurality of receivers and forming start and stop events, said start events including the identity of the one receiver of 15 said plurality of receivers, the binary identification code of said transmitter, and when the pulse bursts of such transmitter

20 was detected by such receiver; said stop event including the identity of the one receiver of said plurality of said receivers, the unique identification code of the said transmitter when loss of reception has occurred within the reception range, and when such loss of reception occurred.

46. A locating and monitoring system installable on the premises of a facility, said system including:

5 at least one portable transmitter means adapted for movement about said facility with a person, with an animal or with equipment to allow monitoring of such transmitter means at any of diverse sites in the facility, said transmitter including means for generating pulse bursts defining an unique binary identification code including bits representing data.

47. The system of claim 46 wherein said transmitter means includes switch means for modifying said additional bits representing data.

48. The system of claim 46 wherein said transmitter means includes programmable memory means modifying said additional bits representing data.

Att B1
AS